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ABSTRACT

Test batteries that predict first quarter freshman GPA's at an open-door predominantly black, urban, community college are reported in this study. Entering freshman performance on an academic aptitude test--College Qualification Tests (CQT), a reading skills test--Davis Reading Test (Davis), and a study habits and attitudes test--Survey of Study Habits and Attitudes (SSHA) was compared with their first-quarter GPA's. Results indicate that performance prediction was relatively greater for male students and that prediction validity was: (1) rather limited using the SSHA, (2) adequate for male students using the CQT and Davis tests, and (3) not significantly increased when the Davis and SSHA variables were added to the CQT variables in multiple correlations. The author finds not only placement and counseling uses--in comparable environments--for these and similar tests, but also suggests their use as a basis on which to restructure admission policies to permit enrollment of a significantly larger proportion of black students. (JO)

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# ABSTRACT

Title: Correlates of Academic Success in a Predominantly Black, Open-door, Public, Urban Community College

Daniel Jay Johns, Ph. D.

The purpose of this study was to determine the test correlates of first-quarter freshman grade point average in a predominantly black, open-door, public, urban community college.

Procedures of the Study

1. The Davis Reading Test, the Survey of Study Habits and Attitudes, and the College Qualification Tests were administered to a split-half random sample of those students attending orientation exercises immediately prior to the beginning of fall quarter 1969 classes. This sample consisted of 87 males and 62 females.

2. Each of the scores available from these instruments--two from the Davis Reading Test, seven from the Survey of Study Habits and Attitudes, and six from the College Qualification Tests--was considered a predictor

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variable, and the first-quarter grade point average was considered the criterion variable.

3. A product-moment correlation coefficient was computed for the relationship between each of the 15 predictor variables and the criterion variable. Separate computations were made for each of three groups: Male, Female, and Total Sample.

4. A multiple correlation coefficient was computed for the relationship between the criterion variable and each possible combination of three predictor variables, one variable from each battery. Separate computations were made for each of three groups: Male, Female, and Total Sample.

## Results of the Study

1. Product-moment correlations for Males were significant at the .05 level, with the exception of those using the Survey of Study Habits and Attitudes variables.

2. Product-moment correlations for Females were significant at the .05 level, with the exception of those using the Numerical score from the College Qualification Tests and the Survey of Study Habits and Attitudes variables.

3. Product-moment correlations for the Total Sample were significant at the .05 level, with the exception of

those using the Survey of Study Habits and Attitudes variables.

4. All multiple correlations for Males were significant at the .05 level.

5. Of the 84 multiple correlations for Females, 63 were significant at the .05 level. Of the 21 correlations which failed to reach significance, 19 involved one of the three Information test scores from the College Qualification Tests, two the Verbal score from the College Qualification Tests, and all the Speed score from the Davis Reading Test.

6. All multiple correlations for the Total Sample were significant at the .05 level.

7. Correlation coefficients were higher for Males in 11 of 15 product-moment correlations and in all multiple correlations, although such differences did not reach significance at the .05 level.

## Implications of the Study

1. The consistent finding of greater male predictability suggests the necessity for replication of the study within the same student population and within black student populations in other college settings.

2. The quite respectable predictive validity

obtained for male subjects with the Davis Reading Test and the College Qualification Tests suggests that these instruments may be adequate predictive measures for black male students in similar college settings.

3. The Survey of Study Habits and Attitudes seems to have questionable validity for this particular population. The Davis Reading Test results, which show a mean reading level of ninth grade for the sample, suggest that the high school version of this test might be more appropriate for future use.

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# Chapter I

## Introduction

Although ours is an era in the history of American education which seems to presage the emergence of the common college (Eurich, 1969), it is also an era which is marked by considerable controversy over race. This controversy frequently centers on the admissions process. Here it is easily demonstrable that the representation of black students among entering freshman classes across the country is considerably less than their representation in the college-age population: such students comprised between six and seven percent of the one and a half million new freshmen who entered college in 1968, while their representation in the college-age population was about 12 percent (Astin, 1969).

Despite the fact that there has been considerable effort on the part of many colleges in recent years to enroll more black students, the research efforts of the American Council on Education indicate that the proportion of blacks among entering freshmen has changed only slightly since 1966 and shows little evidence of increasing.

Furthermore, more than half of all institutions in the country have freshman classes in which the enrollment of blacks is less than two percent. Finally, nearly half of the black freshmen attend predominantly black colleges where the proportion of white students averages less than three percent (Astin, 1969). It would seem reasonable that if the proportion of black students among college freshmen is to increase, there must be some substantial change in college admissions policies. It would also seem reasonable to infer from the research findings of the American Council on Education noted above that there have been no substantial changes in college admissions policies for black students in recent years.

In addition, such changes seem unlikely to occur rapidly. The admissions officer in a predominantly white institution is in a particularly difficult position in this regard. The black students enrolled in his institution are not likely to be representative of the national black student population. Although they may be like their peers in predominantly black institutions in all other respects (Bayer & Boruch, 1969), they are likely to have a significantly higher level of measured ability (Bayer & Boruch, 1969). Thus, research studies conducted in predominantly white institutions are likely to be of little benefit to the empirically-inclined admissions officer who is seeking to increase significantly the proportion of black students in his institution.

It would seem more likely that a representative sampling of black college students could be obtained, therefore, from the predominantly black colleges. However, the typical black college has generally applied the same admissions criteria as have the white colleges (Jencks & Riesman, 1968, pp. 477-78). Therefore, research studies at the typical black institution seem relatively unlikely to support substantial changes in admissions criteria.

One of the most likely places for instituting such studies, therefore, would seem to be one of the new "open-door" commuter colleges which is a predominantly black institution. Indeed, Jencks and Riesman (1968) point to the likelihood that such colleges will "gradually supplant public residential Negro colleges as the states' major vehicles for providing Negroes with B.A.s [p. 475]."

It may be objected that the results of such studies would not be applicable to black students at the typical black institution or the typical white institution. It can be legitimately inferred from the work of Astin (1969) noted above, however, that students at both these types of institutions would not be typical of black students across the country, since as groups they tend to fall near the extremes of the distribution on measures of academic aptitude.

The work of Hoyt and Munday (1969) of the American College Testing Program indicates that students at community colleges show a greater diversity of academic aptitude test scores than those within the typical four-year college. These same authors, moreover, note that there is a considerable degree of overlap between two-year and four-year institutions on such measures. They also note that when the same aptitude test is used, grades are about as predictable in two-year colleges as in four-year colleges (Hoyt & Munday, 1969).

One may argue that such results as those mentioned above were not compiled with predominantly black student samples. However, there seems to be evidence that black students are about as predictable as other students in terms of academic achievement. The work of Boney (1966) seems to indicate that black secondary school students are as predictable as other groups in academic achievement. Astin (1969) notes recent studies which indicate that test scores predict grades for students attending predominantly black colleges equally as accurately as they do for students attending predominantly white colleges.

Thus, it would seem feasible that an open-door, predominantly black community college could provide a representative sample of the national black student population and that test scores from such a sample would be reasonably accurate predictors of academic success.

Tests of scholastic aptitude such as those mentioned thus far in this study have, however, experienced much popular and professional criticism in recent years. Professional criticism has noted their bias in favor of middle- and upper-class white populations and their bias against representatives of atypical subcultures, such as blacks. Popular concern over such measures has increased to the point that the New York City schools in 1964 abandoned the group-administered I.Q. test altogether (Miller, 1967, pp. 71-96).

The rigid grouping of students in the Washington, D.C. schools on the basis of the results of such tests caused much public resentment among the black population. A lawsuit was instigated against the superintendent of schools over this issue by a black parent. The superintendent subsequently resigned when the court ruled against the school system's practices in grouping, and the Washington schools today have virtually no grouping at all as a result.

A number of observers (Berdie, 1965) have noted that the typical correlation between college grades and scholastic aptitude measures is about .50 . Such a correlation accounts for only 25 percent of the variance in grades. In view of this large error factor in prediction and the admitted cultural bias of tests of scholastic aptitude, it was considered appropriate to add a non-intellective measure to the group of predictor variables in this study.

The use of such non-intellective variables in the prediction of academic success has blossomed in recent years, and there seems to be evidence that such variables can contribute materially to multiple correlations with academic success (Fishman, 1962; Brown & Holtman, 1964). Inventories of study habits and attitudes have been among the typical instruments employed (Fishman, 1962).

Since the following study was conducted as part of the research program of the Division of Student Affairs of such an open-door, predominantly black community college, a further requirement of the test instruments to be used was that they be applicable to the counseling and placement of students as well as to the prediction of academic success.

## Statement of the Problem

Measures of academic aptitude, of reading skill, and of study habits and attitudes are typical predictors of academic success. Of these, which are the best predictors of first-quarter grade point averages of freshmen in a predominantly black, open-door, public, urban community college?

## Statement of the Purpose

The purpose of this study was to determine the best predictors of first-quarter freshman grade point average from among three batteries of tests. These tests were an academic aptitude test, a reading skill test, and a study habits and attitudes test. If the product-moment and/or multiple correlations of these scores with first-quarter grade point averages reached significance at the level specified, the best of these correlations would be of some use in the counseling, placement, and prediction of academic success of future first-quarter students at this college. It is also possible that the results of this study might be of some help to admissions officers in schools which are seeking reasonable modifications of their admission policies in order to admit a significantly larger proportion of black students.

Since many of the students admitted to this college are not high school graduates, the results of this study could be useful in the counseling and placement of students currently enrolled in the school.

## Hypotheses of the Study

For a correlation to be considered for analysis as outlined in the hypotheses that follow, it must first have been determined by standard procedures (Bruning & Kintz, 1968, pp. 228-29; Croxton, Cowden, & Klein, 1967, p. 632) that such correlation is significantly related to the criterion variable at or beyond the .05 level of significance.

1. A multiple correlation of grade point average with the Numerical score from the College Qualification Tests (CQT), the Speed score from the Davis Reading Test (Davis), and either the Study Habits score or the Study Attitudes score from the Survey of Study Habits and Attitudes (SSHA) will yield a higher coefficient than will the correlation of grade point average with any other combination of three scores, one from each battery. This correlation will be higher at or beyond the .05 level of significance as determined by a $z$ test for the significance of difference between two proportions (Bruning & Kintz, 1968, pp. 199-201).
2. A product-moment correlation of grade point average with the CQT Total score will yield a

coefficient which is higher than any other such correlation of grade point average with any other score from the three batteries. This correlation will be higher at or beyond the .05 level of significance as determined by a test for the difference between dependent correlations (Bruning & Kintz, 1968, pp. 193-94).

3. A product-moment correlation of grade point average with the Speed score from the Davis will yield a coefficient which, with the exception of the coefficient generated for Hypothesis 2, will be higher than that of any other such correlation of grade point average with any other score from the three test batteries. The test for significance will be conducted as in Hypothesis 2 (Bruning & Kintz, 1968, pp. 193-94).
4. A product-moment correlation of grade point average with either the Study Habits or the Study Attitudes score from the SSHA will yield a coefficient which, with the exception of the coefficients generated for Hypotheses 1 and 2, will be higher than that of any other such correlation of grade point average with any other score from the three test batteries. The

test for significance will be conducted as in Hypothesis 2 (Bruning & Kintz, 1968, pp. 193-94).

The rationale for the selection of the test batteries and the specific variables in the hypotheses above is outlined in Chapters II and III.

## Assumptions of the Study

The study was based on the following assumptions:

1. The academic aptitude of first-quarter freshmen in a predominantly black, open-door, public, urban community college could be measured by the _College Qualification Tests_.
2. The reading skill of first-quarter freshmen in a predominantly black, open-door, public, urban community college could be measured by the _Davis Reading Test_.
3. The study habits and attitudes of first-quarter freshmen in a predominantly black, open-door, public, urban community college could be measured by the _Survey of Study Habits and Attitudes_.
4. The level of difficulty of the academic aptitude and reading skill instruments was appropriate for discriminating between the ability levels of the students.

5. The study habits and attitudes inventory was considered to be of an appropriate level of difficulty to discriminate between students in its non-intellective domain.
6. The first-quarter grade point averages of the students in the study were representative of their academic success at the college.
7. On the tests of academic aptitude and reading skill, the students did as well as they could in the time allotted.
8. On the inventory of study habits and attitudes, the students responded frankly and were capable of understanding and reporting their own motivations and attitudes toward studying and academic activities.

## Limitations of the Study

Limitations of the test instruments. The College Qualification Tests, like all tests whose principal test of validity is correlation with grade point averages, suffer from the lack of reliability of course grades, which varies considerably from institution to institution and from one curriculum to another within a given institution (Froehlich, 1959).

In the same vein, such validity coefficients based on first-semester grade point averages are open to the stricture that such averages are hardly an adequate measure of college success, particularly in view of "often great discrepancies in both directions between grade-getting abilities and capacities for independent thinking and research [Pilliner, 1959]."

The Information score of the CQT has been criticized because it apparently adds little predictive efficiency beyond that of the Verbal and Numerical scores, having as it does a relatively high correlation with either score (Tiedeman, 1959).

In addition, both Tiedeman (1959) and Pilliner (1959) have found the CQT somewhat wanting in its avowed ability to be of help in counseling students about which college curriculum to pursue.

Berdie (1965) has criticized the CQT for its lack of information about the relative predictive effectiveness of the Verbal and Numerical scores combined compared to CQT Total, and notes data from studies done at the University of Minnesota which indicate that the test of Information does not significantly increase the predictive efficiency of the test.

Findley (1965) has criticized the Verbal test of the

CQT for its requiring the examinee to shift back and forth between seeking synonyms and seeking antonyms. He also criticizes this test for its failure to show higher predictive validity and questions whether a vocabulary test can adequately compete with other tests which use reading comprehension in some form in arriving at the verbal measure.

The Davis Reading Test has been criticized by Rosner (1959) for its apparently unnecessary Level of comprehension score. He notes the relatively high correlation between the Speed and Level scores as well as the greater reliability and statistical validity of the Speed score and, therefore, questions the need for both scores.

Raygor echoes in stronger fashion the criticism of Rosner. He indicates that the manual leaves a great deal to be desired in being able to "discriminate and understand the factors which produce differences between the speed score and the level score [Raygor, 1965]."

Finally, Coffman (1965) indicates that the Davis can be criticized for its lack of a rigorously drawn national sample.

The Survey of Study Habits and Attitudes is criticized by Wrenn on the following grounds:

> As either a screening instrument or a diagnostic instrument the test must assume both complete frankness of response and a fairly high degree of

> memory accuracy on the part of the student. . . . The basis for interpretation, however, assumes that the student will respond frankly and that he is capable of understanding and reporting his own motivations and attitudes toward studying and academic activities [Wrenn, 1959].

Wrenn also indicates that the SSHA turns up with an uncontrolled variable of interest or motivation in research studies, noting one study reported by the test authors in which the correlations between grades and test scores were "considerably higher for persons showing interest in their scores than for persons who did not show such interest [Wrenn, 1959]."

Limitations of the data-gathering techniques. Since the prescribed standardized procedures were followed in the administration of the test instruments, the limitations of the data-gathering techniques are largely the limitations of the test instruments themselves. However, the fact that the race of the test administrator was usually Caucasian and that of the vast majority of testing subjects was Negro may have tended to introduce somewhat the variable of anxiety or hostility.

Limitations of the statistical techniques. Perhaps the principal limitation of the use of correlational techniques is their assumption of linearity in prediction. One may find, for instance, that ability has some characteristics of a threshold variable for predicting certain types of performance. The exclusive use of linear correlational methods may tend to block the discovery of curvilinear relationships. This sort of blocking is especially likely with the common practice of trichotomizing the predictor variable and studying only the extremes of the distribution (Lavin, 1965, pp. 38-39).

Limitations of generalization to other populations. Since the study was conducted in a predominantly black, open-door, public, urban community college, the results of the study can be directly generalized only to similar populations.

## Procedures of the Study

1. Tests used for prediction. A review of current literature related to the prediction of academic success was made to identify the types of tests used in such predictions.

2. Review of prediction studies. Prediction studies were reviewed to ascertain the reliability and predictive validity of instruments which might be appropriate for the population to be studied.

3. Selection of instruments. Since the study was conducted as part of the research program of the Division of Student Affairs of the college from which the student sample was drawn, it was thought necessary that the instruments selected be useful for counseling and placement as well as for the prediction of academic success. Since the open-door admissions policy of the college committed it to accepting students without any evidence of their previous academic experience and attainments, it was felt that the population from which the sample was to be drawn would be characterized by a wide range of ability levels. Tests selected should, therefore, be capable of measuring a wide range of ability levels. Since the population from which the sample was drawn was culturally atypical, it was thought useful to include among the predictor variables a non-intellective measure which would not be as likely to suffer from the systematic bias against such populations which is encountered in the usual academic ability test. In addition, the instruments selected should be available for administration and scoring at the convenience of

the college, in order that they may best serve its counseling, placement, and research needs. Finally, the instruments selected must show evidence of contributing to a multiple correlation with grades which was significantly higher than that obtained with the usual academic ability measures. The evidence that the tests selected met such criteria is summarized in Chapter III.

4. Population sample. The sample selected to represent the freshman class at this predominantly black, open-door, urban, public community college consisted of a split-half random sample of those students attending the orientation program prior to registration for their first quarter of study in the fall of 1969.

5. Administration of tests. The total time required to administer the three tests was slightly less than four hours. Each examinee was administered the tests in two sessions. The first was held as part of the college's pre-admissions process in the spring or summer of 1969 at the college or at one of the local high schools. This first session, consisting of the test of academic

aptitude and the test of reading skill, lasted approximately three hours. The tests were administered in large groups by an examiner and several proctors from the staff of the Division of Student Affairs. The administration procedures outlined in the test manuals and summarized in Chapter III were followed in each administration.

The inventory of study habits and attitudes was administered daily at the college during the three days of orientation meetings immediately prior to registration in September of 1969. The inventory was administered in large groups by the researcher and several proctors from the staff of the Division of Student Affairs. These administrations each lasted approximately one hour. The administration procedures outlined in the test manual and summarized in Chapter III were followed in each administration.

6. Grade point averages. Each student's first-quarter grades were obtained from the college's Office of Admissions and Records. A grade point average for each student was computed on the

basis of these grades. The grade point average became the criterion to be predicted.

7. Organization of data for further analyses. Since review of prediction studies (Lavin, 1965, pp. 52-58) indicated that consistent sex differences might be expected in the predictability of academic success, the sample was divided into a male and female sample. Thereafter, there were three groups for analysis: Male, Female, and Total Sample.

8. Product-moment correlation. A product-moment correlation was computed for each of the three sample groups with grade point average as the criterion score and test scores from each part of the three test instruments as predictors. The data included one criterion variable and fifteen predictor variables for each student. The Olivetti-Underwood Programma-101 computer was used to execute the analyses.

9. Multiple correlation. A multiple correlation, as presented by Croxton, Cowden, & Klein (1967, pp. 473-77), was computed for each of the three

sample groups with grade point average as the criterion score. For each sample group 84 multiple correlations were computed, representing all possible three-predictor combinations using one variable from each test battery. The Olivetti-Underwood Programma 101 computer was used to execute the analyses.

10. Findings and conclusions. The findings of the study are reported in Chapter IV.

Definitions of the study. The following terms are defined in order to clarify their use in the study:

1. Academic success will be defined as first-quarter freshman grade-point average.
2. Academic aptitude will be defined as any or all of the following scores from the *CQT*: *Verbal*, *Numerical*, *Information Total*, *Science Information*, *Social Studies Information*, and *CQT Total*.
3. Reading skill will be defined as either or both of the following scores from the *Davis Reading Test*: *Level* and *Speed*.
4. Study habits and attitudes will be defined as any or all of the following scores from the *Survey of Study Habits and Attitudes*: *Delay*

Avoidance, Work Methods, Study Habits, Teacher Approval, Education Acceptance, Study Attitudes, and Study Orientation.

# CHAPTER II

## Review of Literature

This review of research in the prediction of academic success will consist of three sections. The first section will deal with the problems which have arisen in the measurement of academic success and its intellective and nonintellective predictors. The second section will review the prediction of college grade point average with intellective measures, taking particular note of such predictions for black students. The third section will review the prediction of grade point average with nonintellective measures, concentrating on self-report inventories of study habits and attitudes. It will also take particular note of such predictions for black students.

### Problems of Measurement

The principal problem in the measurement of academic success is uncontrolled sources of variation in grades. Lavin (1965, pp. 19-20) notes that there are two major sources of such variation. First, students do not all take the same courses. They major in different curricular areas, and some majors may be more difficult than others.

Second, teachers use different criteria in assigning grades. Differential performance of students under different types of examinations is one source of variation here. Another is the differing weights which instructors assign to performance criteria. Still another source of variation here is the tendency of some instructors to mark harder than others. Finally, there is reason to believe that the nature of the relationship between the student and the teacher is an important source of variation. In this regard, the sex and social class of both may have a differential effect on grades assigned (Lavin, 1965, pp. 19-20). There is some evidence (Carter, 1953) that the objectivity of male teachers is influenced by the sex of the student.

Messick (1966) indicates two common difficulties involved in studies of the prediction of academic success with test instruments. He notes that both the criterion variable and the predictor variable(s) are assessed indirectly.

> . . . potential predictor measures are not evaluated in terms of their empirical validity for _criterion behaviors_, but, rather, in terms of their prediction of _criterion measures_, which, in turn, are presumed to reflect the criterion behaviors of interest. . . . Thus, the question of the intrinsic validity of the

> predictor and of the criterion measures should be broached . . . [p. 567].

Allport (1937, p. 499) has indicated a general difficulty with the interpretation of findings from psychological tests. He notes that such tests assume an identical stimulus situation for each subject and a constant significance for his response. He notes that at the level of personality "it cannot be said with certainty that the same symptoms in two people indicate the same trait, nor that different responses necessarily indicate different traits [p. 499]."

Messick (1966, pp. 565-66) has noted a similar difficulty related to differential response styles to five-alternative multiple-choice items in quantitative aptitude tests. Subjects who prefer broad categories on category-width measures would have an advantage over narrow-range subjects, who tend to require more time-consuming, exact solutions.

Anastasi (1969, pp. 456-61) has noted a number of difficulties with response style in self-report inventories. Among these the tendency to choose more frequently the socially desirable response is particularly important here. Anastasi notes a series of studies on many different groups in which frequency of choice and judged social desirability correlated between .80 and .90 . It would seem that "insofar as social desirability is correlated with test scores, the effectiveness of the test in discriminating individual differences in specific, content-related traits is reduced [p. 457]." Although the forced-choice technique has been introduced in an effort to control this response set, it is Anastasi's opinion that such efforts have not been as effective as had been anticipated.

## Intellective Measures as Predictors

The evidence on the predictive validity of intellective measures as predictors of grade point average has been rather consistent over the past half century. One of the earliest correlational studies, conducted at the University of Arkansas by Jordan (1920), found that Army Alpha correlated .485 with first-year freshman grade point average. Adding high school grade point average to Alpha in a multiple correlation, Jordan found a correlation of .687 . The same study noted similar findings at Brown University, Hamline University, and Southern Methodist University.

A 98-page review of the literature in this area conducted by the United States Office of Education in 1934 (Segel, 1934) indicated that simple correlations generally ranged from .50 to .55, multiple correlations from .60 to

.70 . A 1949 review by Cronbach (1949, p. 267) produced similar results, as did a review by Henry (1950).

A review of the predictive validity of such measures at two-year colleges reveals much the same picture. A recent study (Lunneborg, Lunneborg, & Greenmun, 1970) indicated that grades are "just as easily predicted at two-year schools as at four-year schools using identical traditional aptitude and achievement measures [p. 241]." The same study indicated that such measures also have considerable predictive power for nontraditional curricula such as auto mechanics, data processing, and secretarial studies.

An extensive recent review by Hoyt and Munday (1969) of the predictive validity of the ACT scores at two-year colleges reached a similar conclusion. ACT scores were equally as predictive of grades for two-year and four-year college students, and among two-year students equally as predictive for transfer as for terminal students.

The recent review by Lavin (1965, pp. 51-52) is in line with the earlier findings. He found that simple correlations averaged about .50, with a range of .30 to .70; multiple correlations averaged .65 .

A fitting summary statement for the findings in this area was made by Fishman (1962):

> If the current state of affairs in college selection and guidance research is disturbing, it is not only because the magnitude of our predictions leaves so much to be desired. Rather, it is because so many are still doing exactly the same kinds of things that were being done two decades ago and even four decades ago--and getting exactly the same magnitude of results [p. 669].

A review of the prediction of academic success for black students, however, yields a considerably less consistent picture. First, a number of studies show low or negligible predictive validity for standard aptitude measures. A second type of finding is that these traditional aptitude measures have equal predictive validity for both white and black students, but only in situations in which black students are in black schools and white students in white schools. Here, it seems likely that subcultural bias is in line with test bias within each racial setting. A third type of finding is that traditional aptitude measures have equal predictive validity for both white and black students.

Typical of the first type of finding is the study of Clark (1956). He found that the Scholastic Aptitude Test (SAT) of the College Board seemed to be a poor predictor of academic success for black students from segregated Southern high schools attending integrated Northern colleges. Clark found that these students as a group made satisfactory academic adjustment despite the fact that their average SAT scores were markedly below national norms consistent with academic success.

A general study of possible discrimination between the performance of white and black students on items from the Preliminary Scholastic Aptitude Test (PSAT) was recently made by Cleary and Hilton (1966). They found that few items on the PSAT produced an uncommon discrimination. They concluded, however, that discrimination is not largely attributable to particular items, but to the test as a whole.

A more recent study by Bradley (1967) found little validity for the American College Testing (ACT) Program aptitude scores in predicting grade point average of black students in predominantly white colleges in Tennessee. The ACT scores exhibited significantly more predictive validity for white students at the same schools.

A study by Stanley and Porter (1967) illustrates the second type of finding. They found that the correlation of SAT with college grades was about the same for white students in white colleges and black students in black colleges. This similarity in predictability occurred despite the very large difference in mean aptitude scores between the two groups.

A similar finding was reported by Hills (1964). He compared the predictive validity of SAT for students at three black colleges in Georgia and for students at Georgia Tech. He found that the SAT measures predicted grade point average equally well for black and white students.

The third type of finding is illustrated in a study by Boney (1966). He found aptitude measures equally valid in predicting grade point average for black and white high school students.

A similar finding was reported by McKelpin (1965). At predominantly black North Carolina College he found that the predictive validity of SAT was as high as that usually reported for college freshmen.

There is mounting evidence that aptitude measures are equally as predictive for black college students as for white (Green, 1969). Green, however, suggests that there is still a need for further research in this area.

At this point the preponderance of the evidence seems to favor the hypothesis that predictive validity is more likely to be comparable when one compared black students in black schools with white students in white schools. Stanley & Porter (1967) concur with this hypothesis.

### Nonintellective Measures as Predictors

The relationship between ability and academic performance is well known but on the average accounts for less than half the variation in college grades. Thus, the great majority of contemporary studies attempt to improve correlations through the addition of nonintellective predictors.

Evidence on the use of such predictors, however, has generally been unfavorable. Fishman (1962) has pointed out that the gain in multiple correlation upon adding a nonintellective measure to one or both of the usual predictors (high school grades and scholastic aptitude) is generally less than +.05 . He further comments that the likely explanation for such results is that nonintellective measures "seem to be measuring something insufficiently dissimilar from whatever it is that our usual predictors are measuring [p. 670]." Fishman concludes that our usual intellective predictors may actually be the best available measure of nonintellective factors:

> Because our usual intellective predictors tap so much of the variance contributed by self and social selection, most other measures of these factors simply replicate much of the information already contained in these apparently single, apparently simple and apparently intellectual predictors [p. 682].

A review of personality research by Messick (1966) reaches much the same conclusion for a different reason. He asserts that though many personality measures are available for the prediction of academic success, "none is adequate when systematically evaluated against psychometric standards [p. 566]."

A typical finding of this sort comes from the attitudinal study of Birney and Taylor (1959). They found that for freshmen a measure of scholastic orientation (valuing intellectual pursuits) had essentially no correlation with grades.

Ahmann, Smith and Glock (1958) observed that the Survey of Study Habits and Attitudes (SSHA) developed by Brown and Holtzman did not add significantly to the validity of a battery of intellective measures in predicting college grades. Anderson and Kuntz (1959) found that the SSHA did not differentiate students on academic probation from nonprobationers.

Studies which have controlled for ability, however, have shown such inventories of study habits and attitudes positively correlated with academic performance. The Birney and Taylor (1959) study cited above found scholastic orientation correlated .29 with grades for male college seniors when ability was controlled. A number of studies with the SSHA (Burgess, 1956; Maher, 1959; Schutter & Maher, 1956) have produced similar findings.

It seems that studies of measures of study habits and attitudes exhibit a wide variety of findings. A number of studies seem to indicate that such inventories can make a significant differentiation between academically successful and unsuccessful students (Cuff, 1937; Hadley, 1957; McCallister, 1958). Sie (1955) found that the SSHA independently accounts for some of the variation in grades in college. Mehrens and Lehmann (1969) conclude that the validity data presented in the SSHA test manual indicate that the SSHA is "independent of scholastic achievement and that there is an increase in the predictive efficiency of grades when the SSHA is used in combination with aptitude test scores [p. 260]."

Summarizing the body of research on self-reports of study habits and attitudes, Lavin (1965) indicates that

> . . . measures of study habits can predict academic performance even where ability is controlled. In addition, the studies show that positive attitudes toward school, such as beliefs in the value of intellectual pursuit and of education in general, are positively related to academic performance. . . . Even though the general trend of the findings indicates the usefulness of these measures, there are a few inconsistent findings. More work is needed to assess the reasons for this variability [pp. 68-69].

When one moves to a consideration of the use of such self-report measures in predicting the academic success of black students, he should bear in mind that "even more than ability tests, personality tests can be expected to show large subcultural as well as cultural differences [Anastasi, 1969, p. 447]." As has been seen in the case of aptitude measures, however, such differences need not necessarily be accompanied by significantly lessened predictive validity.

The use of such an inventory by Fricke (1965, p. 280) with a group of black students at the University of Michigan produced some promising results. These students would not ordinarily have been considered college material. No relationship at all was found between their high school records and first-semester grade point averages. The use of an Opinion, Attitude and Interest Survey (OAIS), however, greatly improved the predictive validity of standard indicators with these students.

This investigator is indebted to an author of the SSHA for the knowledge of its extensive use in predominantly black colleges and universities.[1] In research conducted over a number of years at Huston-Tillotson College, Prairie View A & M College, St. Philips College, Texas College, and Texas Southern University, correlations with first-semester grade point average have ranged from .42 to .46 . A peculiar feature of the use of this instrument at these institutions should be noted, however. In every instance, the SSHA was administered to students who understood in advance that their test results would be used in a program of student-to-student counseling. In an early study (Holtzman, Brown, & Farquhar, 1954), examinees were told when the SSHA was administered that anyone who was interested could obtain his score and an interpretation by contacting one of the authors. For those motivated to make inquiry, correlations with first-semester grade point average were .65 for women and .71 for men; for those not so motivated, correlations were .43 for women and .41 for men. Wrenn (1959) notes this finding and posits that it indicates the presence of an uncontrolled variable of motivation or interest.

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[1] William F. Brown, personal communication, March 19, 1970.

It seems appropriate to conclude this section with Lavin's (1965) summary of his extensive review of the research literature in the use of personality factors as predictors of academic success. He notes that his findings

> . . . should not lead the reader to think that we can, at present, be very confident about the state of knowledge regarding the relationship between personality characteristics and academic performance. In most cases these relationships are quite weak, and, as we have seen, the findings are often inconsistent. Essentially, we think that the literature presents a somewhat disappointing picture. Yet we do not conclude that personality variables are simply not very useful as predictors. The current disappointing state of affairs may be more a reflection upon how personality variables have been used rather than upon their absolute usefulness [p. 111].

High school achievement was not used as a predictor variable in this study for two reasons. First, transcripts were not available for all subjects; second, a number of the subjects in this study were not recent high school graduates. It was felt that the use of high school records would not provide comparable measures of academic achievement.

All the predictor measures for this study were chosen on the bases of their predictive validity and their usefulness in placement and counseling.

Since academic aptitude was found to be a valuable predictor of academic success in college, two tests of academic aptitude were chosen as predictor variables: a test of reading ability and a test battery of general academic aptitude. The tests selected and the reasons for selecting them are discussed in Chapter III.

The review of the related literature revealed that self-report inventories of study habits and attitudes were also valuable predictors of academic success in college. The test selected and the reasons for selecting it are reviewed in Chapter III.

# Chapter III

## Selection, Description, and Evaluation of Tests

This chapter has three principal functions. First, it shall enumerate the criteria used for selecting an individual test. Second, it shall describe in detail the test and its prescribed administration procedures. As indicated in Chapter I, such procedures were followed closely in the administration of each test. Third, the test will be evaluated in terms of the specified selection procedures.

### Test of Academic Aptitude

The population to be tested consisted of adults of potentially diverse academic, vocational, and socio-economic backgrounds. No records of their scholastic achievement or aptitude were required for admission to the college. Therefore, it was thought advisable to include in the admissions process a group test of general academic aptitude.

It would have been preferable to use a test with general adult norms, but no such test was found. The only available alternative was individually administered tests of general intelligence such as the Stanford-Binet Intelligence Scale or the Wechsler Adult Intelligence Scale. Cost limitations and the necessity for trained administrators precluded the use of such instruments.

A number of criteria were considered in the selection of the test. The first of these was variety of applicability. The college at present has no scholastic admissions criteria. However, it expects to adopt such criteria in the near future. Therefore, the test selected should be generally predictive of college academic success.

The absence of scholastic admissions criteria suggested that the test to be selected also be useful for counseling and placement. Therefore, it seemed necessary to select a test battery which included measures of both academic aptitude and academic achievement. Such a battery would be helpful in the counseling and placement of students with a wide variety of achievement in relation to measured ability.

A final requirement was that the test be available at times and places selected by the college. The college is a community college serving varied segments of the general population and admitting new students at least four times a year. Therefore, it must be able to administer the test at a number of different times and places during the year. Such administrations must be available on a flexible schedule and for a variety of locations in order that the college might fulfill its obligations to the community. Such flexibility is not usually possible when a college uses the services of a national test administrator.

Included within this requirement is also the flexibility to grade its tests in whatever fashion and by whatever agency the college chooses. Adaptability to community needs and autonomy of institutional research programs are implied within this requirement.

Although these three were the major requirements, such criteria as the restriction of at least one form of the test to use by colleges, availability of respectable reliability and validity information, ease of administration and scoring, cost, and length of administration time were also considered. Reading ability and study habits and attitudes were avoided since they were to be measured by separate instruments.

The test instrument selected to measure academic aptitude was the College Qualification Tests (CQT). The authors of the tests were George K. Bennett, Marjorie G. Bennett, Wimburn L. Wallace, and Alexander G. Wesman. The tests were first published in 1957 by the Psychological

Corporation of New York, New York. The original forms A and B were supplemented in 1960 with the publication of Form C. The latter two forms are restricted to use by colleges (Bennett, Bennett, Wallace & Wesman, 1961, pp. 12-14).

The form of the tests administered was Form A in the Combined Booklet Edition. The tests require a reading knowledge of the English language. Designed as group tests, they were administered in large groups with an examiner and several proctors. The examinees recorded their answers on an IBM answer sheet, and the results were machine scored, while the re-usable test booklets were used in a number of different administrations. As the following description will indicate, the test was virtually self-administered.

Format of the test. The fifteen-page booklet given to each student is divided into three parts. The first part, Test V, is composed of 75 series of five words each. The first word is written in capital letters; the remaining four are numbered. There are two types of directions for these series. One of these asks the examinee to select the numbered word which means the same or nearly the same as the capitalized word. The other type of directions asks the examinee to select the word which is opposite in meaning to that of the capitalized word. There are two examples in the directions for the test, one with each type of directions (Bennett, Bennett, Wallace & Wesman, 1956, pp. 3-5).

After filling in the pertinent identification data at the top of the answer sheet, the examinee is asked to read the directions and examples to himself as the examiner reads them aloud. Having allowed the examinees sufficient time to study the examples, the examiner instructs the examinees to try to answer all questions, guessing when unsure of the answer. He then asks if there are any questions and answers those that arise. Next, he indicates that the time allowed for the test will be 15 minutes and that those who finish before time is called are to check their work, adding that the examinee is not to go on to the next test (Bennett, Bennett, Wallace, & Wesman, 1961, p. 8).

The examinee turns the page and finds 25 capitalized words on each page, the directions for the entire page in bold-faced type at the top of the page. The first and third pages instruct the examinee to choose the word which means the same; the second page instructs him to choose the word which means the opposite (Bennett et al., 1956, pp. 4-6).

For the next test, Test N, the format of administration is much the same as for the preceding test, with the additional information given that there will be 50 problems in this test. The time limit is 35 minutes. The format is a short phrase or set of symbols stating a mathematical problem, followed by a choice of four numbered answers. The test is again three pages in length (Bennett et al., 1956, pp. 7-10; Bennett et al., 1961, p. 8).

The administrative format of the third and final test, Test I, is virtually identical to that of Test N. There are 75 questions to be answered in 30 minutes. They deal with general information about social science and natural science, with 37 items devoted to the former and 38 to the latter. The items are in the form of a sentence to be completed or a question to be answered with one of the four numbered answers that follow in each item. The test is four pages in length (Bennett et al., 1956, pp. 11-15; Bennett et al., 1961, p. 8).

Evaluation of the test. In an earlier part of this chapter, it was indicated that the initial selection criterion should be that the test instrument was generally predictive of college academic success. Berdie (1965) indicates that this criterion has been met. He notes that the median correlation is .57 for the 47 correlations reported between total score and grades for four-year institutions. He asserts that this correlation is somewhat higher than the figure of .50 which has typically been ascribed to the correlation between college aptitude test scores and freshman college grades.

Although there is no validity information reported in the test manual about the instrument's predictive capabilities for two-year college students, there is evidence from a recent study by Hoyt and Munday (1969, p. 105) that test scores are about as useful as predictors of academic success in two-year colleges as they are in four-year colleges when the same test instruments are used in both settings.

The second requirement--that the instrument selected should include measures of both scholastic aptitude and scholastic achievement in order that it be widely useful in counseling and placement--also seems to have been met. The inclusion in the battery of a test of general information in addition to traditional measures of verbal and numerical aptitude seems to fulfill this expectation.

Findley (1965) has indicated in a recent review of the tests that the inclusion of an information test "gives this battery an advantage over most competing measures of scholastic aptitude [p. 711]." He adds that the validity coefficients show this test, if anything, to be more predictive of grade point average than are the Verbal and Numerical tests.

Findley (1965) has also made a general defense of the inclusion of such measures in tests of scholastic aptitude:

> It should be noted in regard to this issue that scholastic aptitude measures which lack an information section are also subject to criticism on two counts, predictive and instructional. The predictive criticism, supported by validity coefficients, is that structured knowledge of useful factual information is quite as basic a characteristic of a vigorous mind as are the "basic skills" of verbal comprehension and quantitative reasoning. . . .
>
> The scholastic aptitude battery that lacks an information test may be criticized for favoring those with basic skills who have not put their skills to use in mastering substantive knowledge, over students with somewhat lesser basic skills who have put their skills to good use in acquiring structured knowledge [p. 712].

That the tests meet the third criterion is quite easily demonstrated. The test booklets, keys and answer sheets are purchased outright from the Psychological Corporation, and, therefore, the tests may be administered at times suitable to the needs of the college and may be scored by whatever agency it chooses. The research and administrative flexibility that this arrangement provides is considerable.

The criterion that at least one form of the test be restricted for use by colleges has been met by the development of Forms B and C of the tests, used exclusively by colleges (Bennett et al., 1961).

Ease of administration has been documented in general in the description of test format in an earlier section of this chapter. The tests are virtually self-administered and require no special expertise on the part of the examiner.

Ease of scoring is as readily documented. The tests may be readily scored by clerical personnel with the hand-scoring keys, or they may be quite as readily scored by IBM machine-scoring.

Length of administration time has also been discussed in an earlier section of this chapter. The authors (Bennett et al., 1961, p. 6) estimate that with an actual testing time of 80 minutes, an hour and three-fourths should be sufficient for all administrative duties.

The cost criterion seems to be met quite adequately by the relative inexpensiveness of the tests. Twenty-five reusable test booklets cost only $5.00, and IBM answer sheets are available for $3.50 per 50 (Buros, 1965, p. 708).

As to the tests' meeting the necessary technical criteria of validity and reliability, mention has been made in an earlier part of this section of Berdie's (1965) noting that the average validity coefficient reported in the test manual is somewhat above the usual expectation for such coefficients. In the same review Berdie also notes the satisfactory reliability of the tests.

The following statement by Findley (1965) seems a fitting summary of this evaluation:

> The College Qualification Tests are well conceived, show excellence in item construction, are supported by varied and substantial data on reliability, validity, and norms, which are in turn reported with professional rigor and contain a significant emphasis on substantive knowledge which is unique for a scholastic aptitude battery. They are appropriate for selective admissions . . . . They can serve academic placement and counseling uses as presently constituted . . . . Users may rely on this instrument as sound and in some ways unique [p. 714].

## Reading Ability Test

The criteria for selection of a test of reading ability were similar to those used in the selection of a test of academic aptitude. In the present instance, the researcher was looking for an instrument that would be of an appropriate grade level for the sample to be tested. The population from which the sample was to be drawn was freshmen at a predominantly black college. Therefore, the reading test to be selected must be of a reading level appropriate to that of the average freshman class at a predominantly black college.

As with the test of academic aptitude, it was important that the test results have wide applicability, particularly for the areas of counseling and placement.

The reading test results were to be correlated with academic success, both separately and as a part of a multiple correlation with measures of academic aptitude and of study habits and attitudes. Therefore, it would seem necessary that the test show satisfactory evidence of correlation with academic success, and that it show promise of contributing significantly to the multiple correlation mentioned above.

In addition to these three major requirements, it was felt that the reading test to be selected should show satisfactory evidence of reliability, should be easy to administer and score, should be of modest cost, should be of relatively short duration, and should be able to be administered at times suitable to the college and to be scored by whatever agency the college chose.

The instrument selected to measure reading ability was the _Davis Reading Test_ for grades eight through eleven. _Series I_ of the test was published in 1957 by Frederick B. Davis and Edith Croom Davis for grades 11-13. _Series 2_ was published by the Psychological Corporation in 1961 for grades eight through eleven. Four forms of _Series 2_ were available (Buros, 1965, p. 1053). _Form 2B_ was used in this study.

Tables of normative data were available in the examiner's manual for each grade level from the eighth to the thirteenth grade. Other tables of statistical evaluation of the test were also included in the examiner's manual (Davis & Davis, 1961b).

Format of the test. The eleven-page booklet given to each examinee is composed of a single section of 11 reading passages, each passage followed by a series of from four to eleven multiple-choice questions relating to the passage. There are 80 questions altogether (Davis & Davis, 1961a).

After filling in the pertinent identification data at the top of the answer sheet, the examinee is asked to read the directions silently as the examiner reads them aloud. If the examinees have never used the IBM answer sheets before, the examiner illustrates the process with a sample item prepared in advance on the blackboard (Davis & Davis, 1961b, pp. 6-7).

Then the examiner asks if there are any questions about what is to be done and answers any legitimate questions as briefly as possible. Since the directions have indicated that the examinee should guess when he is not sure of the answer but is cautioned not to guess wildly, the examiner is instructed to answer frankly any questions about the method of scoring. To the question whether or not there is to be a subtraction for wrong answers, he is to answer that one quarter of a point will be subtracted for each wrong answer (Davis & Davis, 1961a; Davis & Davis, 1961b, p. 7).

When the questions have been answered, the examinees are told that they will have 40 minutes for the test, and instructed to open their booklets and begin (Davis & Davis, 1961b, p. 7). The examinee opens the booklet and finds the eleven passages, each with a series of questions, as outlined above (Davis & Davis, 1961a).

_Evaluation of the test_. The initial selection criterion for the test was that it be of appropriate reading level for the average freshman at a predominantly black college. Jencks and Riesman (1968, p. 431) have indicated that the average freshman at predominantly black colleges performs at about the ninth-grade level.

In this regard, one must also consider the effective range of the test. It must, in this case, not merely center around the modal achievement of ninth-graders but also have an effective range of discrimination anchored at both extremes from that mode. Coffman (1965) in a review of the _Davis Reading Test_ in the most recent edition of the _Mental Measurements Yearbook_ indicates that Series 2 of the test is appropriate for many groups below the eighth-grade level; he also adds that this series has a comfortable overlap with the eleventh-grade sample of _Series I_. Thus, it would appear that the test meets the first criterion.

The second selection criterion was that the test should have applicability to the areas of counseling and placement. In a recent review of the test, Rosner (1959) notes that reading comprehension is an important determinant of success in college programs of study. In this regard, he indicates that the Davis Reading Test should provide useful information for college guidance personnel.

The test must also demonstrate its usefulness in placement. This particular criterion seems to be met by this particular college's utilization of the test. In the general absence of transcript information about freshmen students, the college has used the Davis Reading Test scores as the criterion for placement of students in remedial English classes.

The third selection criterion was that the test results be significantly correlated with college grades and show promise of adding significantly to multiple correlations. Here Rosner (1959) notes that predictive validity is good, correlations with high school and college English grades averaging approximately .50 . Other validity information from the examiner's manual (Davis & Davis, 1961b, p. 22) indicates an average correlation of .48 with first semester college grade point average. Although there is no direct evidence of the predictive validity of Series 2 scores with college grade point average, the fact that the two series have comparable validity in the prediction of high school grades, that they share a common format and test administration time, and that there is considerable overlap between the top of Series 2 and the bottom of Series I (Davis & Davis, 1961b, pp. 23, 24; Coffman, 1965) seems to indicate that test results from Series 2 might have a reasonably high correlation with college grades as well.

The second part of this criterion is that the test results show promise of contributing significantly to a multiple regression analysis of grade point average, with academic aptitude and study skills and attitudes as the other two predictor variables. Since the College Qualification Tests have been chosen as the measure of academic aptitude for this study, a practical consideration in this regard would be that there be a relatively low correlation between the CQT and the Davis Reading Test, with a relatively high correlation between each of the two and grade point average. That the latter seems to be the case has been documented above. Correlations between the various CQT scores and the Davis scores recorded in the Davis test manual (Davis & Davis, 1961b, p. 26) indicate that the Numerical Test from the CQT has a correlation of roughly .47 with the Davis scores. The other CQT scores correlate with the Davis scores roughly from .60 to .80 . Thus, it seems likely that the Davis scores will add substantially to multiple correlations with grade point average when combined with the Numerical score from the CQT but not when combined with other scores from the CQT battery.

Another criterion was that the test selected should show satisfactory evidence of reliability. In this regard, a recent review by Coffman (1965) has noted that statistics presented in the examiner's manual indicate that a high standard of reliability has been attained in the several forms of the test. Average reliability coefficients reported in the manual for Series 2 range from .77 to .91, with an average of .85 (Davis & Davis, 1961b, p. 15).

The criterion of ease of administration has been documented above in the description of the test administration. The test, as evidenced by the description noted above, is virtually self-administered. The short duration of the test has also been well documented above. The test authors (Davis & Davis, 1961b, p. 5) have indicated that 5 to 15 minutes beyond the testing time of 40 minutes should suffice for most administrations of the test.

That the test be relatively inexpensive is a criterion which is easily met as well: $6.00 is the total cost of 25 re-usable test booklets, a set of scoring stencils and a manual, and 50 IBM answer sheets.

That the test and scoring stencils can be purchased outright from the Psychological Corporation enables the individual college to administer the test at the times of its own choosing and to have the tests scored by whatever agency and in whatever fashion it chooses. The machine- or hand-scoring of the test is simple and inexpensive.

Thus, it would seem that the Davis Reading Test meets all the criteria that have been established for the inclusion of a reading test in this study.

### Test of Study Habits and Attitudes

The criteria for the selection of a test of study habits and attitudes were similar to those used in the selection of a test of reading ability. In this instance, the principal requirements were two. First, the test should be an attitudinal measure which showed a substantial correlation with college grades; and second, the test should have a relatively low correlation with measured scholastic aptitude. The combination of these two characteristics in a single instrument would virtually assure that the instrument would make a significant contribution to a multiple correlation with college grade point average.

The tests of academic aptitude and reading skill that have been selected were part of the admissions process at the college. Results from them were, therefore, expected to be of value in the counseling and placement of students, especially in the absence of records of earlier scholastic performance. It was thought advisable that the test of study habits and attitudes be useful as a counseling instrument as well.

In addition to these requirements, it was felt that the test of study habits and attitudes should show satisfactory evidence of reliability, should be easy to administer and score, and should be of modest cost. The instrument should also be of relatively short duration, and the college should have sufficient control over the test so as to be able to administer and score the test at its own convenience.

The instrument chosen to measure study habits and attitudes was the Survey of Study Habits and Attitudes (SSHA). The authors of the test were William F. Brown and Wayne H. Holtzman. The SSHA was first published in 1953 by the Psychological Corporation of New York, New York. A revised edition (Form C) was published in 1956 for college use, and a further revision (Form H) was published in 1959 for use in grades 7-12 (Brown & Holtzman, 1964, pp. 24-27).

The form of the test administered was Form C. The test was designed as a group test and was administered in large groups with an examiner and several proctors. The examinees recorded their answers on an IBM answer sheet, and the test booklets were re-usable. The test results could be readily and inexpensively obtained through hand- or machine-scoring. The test was virtually self-administered.

Format of the test. The seven-page booklet given to each student is composed of a single section of 100 short statements to which the examinee must respond (Brown & Holtzman, 1965).

After filling in the pertinent identification data at the top of the answer sheet, the examinee is asked to open the booklet and read the directions silently as the examiner reads them aloud. The examiner explains the use of the IBM answer sheet when necessary (Brown & Holtzman, 1964, p. 7).

The directions in the test booklet indicate that there are 100 statements in the test, to each of which the examinee is to respond with letters which indicate how often the statement is true for him. He is to respond with R if the statement is rarely true for him (0 to 15 percent of the time), with S if the statement is sometimes true for him (16 to 35 percent of the time), with F if the statement is frequently true for him (36 to 65 percent of the time), with G if the statement is generally true for him (66 to 85 percent of the time), and with A if the statement is almost always true for him (86 to 100 percent of the time). These letters are imposed over each of the five parallel spaces for filling-in on each item on the answer sheet. The explanation of the symbols in both words and percents is written in large type and featured in a prominent place at the top of the answer sheet (Brown & Holtzman, 1965).

There is no time limit on the test, and the examiner is allowed to answer questions regarding directions or the meanings of words, provided that he does not prejudice the examinee's answer in so doing. When approximately 80 percent of the examinees have completed the test, the examiner requests a careful recheck of the answer sheet by all who have finished. In this way early finishers may be kept fruitfully occupied until those who work more slowly can finish (Brown & Holtzman, 1964, p. 7).

Evaluation of the test. The initial selection criteria for the test of study habits and attitudes were that it be an attitudinal measure which showed substantial correlation with college grades and, at the same time, relatively low correlation with measured scholastic aptitude. Evidence from the examiner's manual (Brown & Holtzman, 1964, pp. 16-19) seems to indicate that these two criteria have been met. Criterion data on the correlation of Form C of the SSHA with freshman grades for 1,772 students at six colleges shows a weighted average correlation of .36 . For the same subjects, the comparable average correlation between measures of scholastic aptitude and the SSHA is .21, the range being from .05 to .27, and at each school lower than for the correlation of SSHA with grade point average. Deese (1959) has indicated that to a surprising degree what the inventory measures is independent of scholastic aptitude.

Furthermore, for the same subjects the multiple correlation of grades with SSHA and scholastic aptitude test scores ranges from .07 to .16 higher than the correlation of grades with scholastic aptitude test scores alone (Brown & Holtzman, 1964, p. 18).

The criterion of usefulness for counseling seems to be met by the existence of an apparently useful counseling key for the instrument. The key indicates those responses that significantly distinguish those students doing poor work from those doing good work. The higher the score on this key, the poorer the work the student is likely to be doing. The examiner's manual also presents some evidence of the validity of this key (Brown & Holtzman, 1964, pp. 12, 16).

The criterion of reliability seems, on the basis of the data reported in the examiner's manual (Brown & Holtzman, 1964, p. 24), to have been met quite adequately. The internal consistency coefficients range from .87 to .89 for individual scales of the inventory, with test-retest reliability ranging from .88 to .94 for a 4-week interval and from .83 to .88 for a 14-week interval.

That the SSHA meets the criterion of ease of administration seems to have been amply demonstrated in the description of the test format above. Scoring ease seems adequately demonstrated also by the fact that the test can be quite readily scored by clerical personnel with hand-scoring stencils or by IBM test-scoring machines.

The cost of the instrument is quite modest as well. For the low cost of $4.85, one can obtain 25 re-usable test booklets, 50 IBM answer sheets, a set of scoring stencils, and an examiner's manual (Buros, 1965, p. 1140).

The instrument, in addition, takes a relatively short time to administer, the average time being 25-35 minutes (Buros, 1965, p. 1140).

In this case, also, since the instrument is sold outright to the college, the college has sufficient control over its use such that the test can be administered and scored at the convenience of the college.

Thus, it would seem that the Survey of Study Habits and Attitudes meets all the criteria that have been established for the inclusion of a test of study habits and attitudes in this study.

## Summary

The test selected to measure academic aptitude was the College Qualification Tests. This test yielded six scores: Verbal, Numerical, Information Total, Science Information, Social Studies Information, and CQT Total.

The test selected to measure reading ability was the Davis Reading Test. This test yielded two scores: Level and Speed.

The test selected to measure study habits and attitudes was the Survey of Study Habits and Attitudes. This test yielded seven scores: Delay Avoidance, Work Methods, Study Habits, Teacher Approval, Education Acceptance, Study Attitudes, and Study Orientation.

These fifteen scores were the predictor variables for the correlational analyses of this study.

# Chapter IV

## Findings, Conclusions, Discussion, and Recommendations

This final chapter will present the statistical findings of the study, the conclusions which seem to be indicated by such findings, a discussion of the probable implications of these findings, and recommendations for further research. The tables of correlational results of the study are presented in Appendices A, B, C, D, E, and F. Appendix A contains the product-moment correlations for the Male Sample. Appendix B contains the multiple correlations for the Male Sample. Appendices C and D contain, respectively, the product-moment and multiple correlations for the Female Sample. Appendices E and F contain, respectively, the product-moment and multiple correlations for the Total Sample.

### Findings of the Study

#### Averages and percentiles for the predictor variables.

In Table 1 are presented the average scores and percentile ranks for the _CQT_ variables. The percentiles are based on national junior college freshman norms (Bennett, Bennett, Wallace, & Wesman, 1961, p. 26). The percentile is presented in parentheses under each average score. These percentiles are based on separate norms for males and females. For this reason no percentiles are given for the Total Sample.

Table 1

CQT Average Scores and Percentile Ranks

| | No. in Sample | SC | SS | I | V | N | CQT |
|---|---|---|---|---|---|---|---|
| M | 87 | 15.6<br>(18) | 15.2<br>(20) | 30.8<br>(17) | 25.4<br>(20) | 16.2<br>(22) | 72.3<br>(15) |
| F | 62 | 14.9<br>(32) | 14.4<br>(23) | 29.3<br>(25) | 29.4<br>(23) | 13.9<br>(31) | 72.6<br>(21) |
| T | 149 | 15.3 | 14.9 | 30.2 | 27.1 | 15.3 | 72.4 |

Table 2 presents the average scores and percentile ranks for the SSHA variables. The percentiles are based on general college freshman norms (Brown & Holtzman, 1964, p. 13), with no separate norms for males and females. Percentiles are again in parentheses.

Table 2

SSHA Average Scores and Percentile Ranks

| | No. in Sample | DA | WM | SH | TA | EA | SA | SO |
|---|---|---|---|---|---|---|---|---|
| M | 87 | 21.8<br>(39) | 23.5<br>(44) | 45.3<br>(41) | 27.4<br>(27) | 27.3<br>(33) | 54.6<br>(28) | 99.9<br>(34) |
| F | 62 | 25.5<br>(52) | 26.3<br>(54) | 51.7<br>(53) | 29.2<br>(35) | 30.1<br>(45) | 59.3<br>(39) | 111.1<br>(46) |
| T | 149 | 23.3<br>(42) | 24.7<br>(49) | 48.2<br>(46) | 28.1<br>(30) | 28.4<br>(38) | 56.6<br>(33) | 104.6<br>(39) |

Table 3 presents the average scores and percentile ranks for the Davis Reading Test variables. Percentiles are based on 9th grade norms, with no separate norms for males and females (Davis & Davis, 1961b, pp. 12-13). Percentiles are again in parentheses.

Table 3

Davis Average Scores and Percentile Ranks

| | No. in Sample | L | S |
|---|---|---|---|
| M | 87 | 19.3<br>(50) | 27.7<br>(50) |
| F | 62 | 21.1<br>(56) | 33.7<br>(58) |
| T | 149 | 20.1<br>(56) | 30.2<br>(50) |

Grade point averages. Grade point averages for each of the sample groups were as follows: Male Sample--0.938; Female Sample--0.857; Total Sample--0.904 . The grade point averages were computed from the following scale:
High Pass = 2, Pass = 1, Incomplete = 0 .

Correlational results. Appendix A contains for the Male Sample the coefficients of correlation of grade point average (GPA) with the 15 predictor variables, in addition to the inter-battery coefficients necessary for the computation of the multiple correlation coefficients (Croxton, Cowden, & Klein, 1967, pp. 473-77). Such inter-battery coefficients are also presented in the product-moment correlation tables for the other sample groups. These coefficients were presented in order to facilitate the understanding and interpretation of relationships between the predictor variables and the criterion variable.

An inspection of the results presented in Appendix A indicates that all the predictor variables from the Davis Reading Test (Davis) and the College Qualification Tests (CQT) were significantly related to GPA at or beyond the .05 level of significance. By contrast, none of the predictor variables from the Survey of Study Habits and Attitudes (SSHA) reached this level of significance.

An inspection of Appendix C indicates that much the same type of result was obtained with the Female Sample. With the exception of the Numerical (N) score from the CQT, all the predictor variables from the CQT and the Davis were correlated with GPA at or beyond the .05 level of significance. The coefficient of correlation of N with GPA did, however, approach the critical value of .195 (Bruning & Kintz, 1968, pp. 228-29). As with the Male Sample, none of the correlations of the SSHA with GPA reached this level of significance.

The coefficients presented in Appendix E show much the same type of result for the Total Sample. All the predictor variables from the CQT and the Davis were correlated with GPA at or beyond the .05 level of significance. As was the case with the other two sample groups, none of the coefficients of the correlation of GPA with the SSHA variables reached the .05 level of significance.

In summary, with the exception of N in the Female Sample, all the predictor variables from the CQT and the Davis were correlated with GPA at or beyond the .05 level of significance. However, none of the coefficients of the correlation of the SSHA variables with GPA reached this level of significance.

Appendix B presents the results of the multiple correlation of the predictor variables with GPA for the Male Sample. These coefficients represent the results of all possible three-predictor combinations of one variable from each battery. All of these coefficients reached the .001 level of significance.

Appendix D presents the results of multiple correlations for the Female Sample. Here a number of coefficients failed to reach the specified .05 level of significance. A summary of these results is as follows:

1. All combinations of Level (L) of reading comprehension, Delay Avoidance (DA) and CQT variables reached the specified level.
2. Of the combinations of Speed (S), DA, and CQT variables, those combinations containing Science Information (SC), Social Studies Information (SS), and Information Total (I) failed to reach the specified level.
3. All combinations of L, Work Methods (WM), and CQT variables reached the specified level.
4. Of the combinations of S, WM, and CQT variables, those combinations containing SC, SS, and I failed to reach the specified level.
5. All combinations of L, Study Habits (SH), and CQT variables reached the specified level.

6. Of the combinations of _S_, _SH_, and _CQT_ variables, those combinations containing _SC_, _SS_, and _I_ failed to reach the specified level.
7. All combinations of _L_, _Teacher Approval (TA)_, and _CQT_ variables reached the specified level.
8. Of the combinations of _S_, _TA_, and _CQT_ variables, those combinations containing _SC_, _SS_, and _I_ failed to reach the specified level.
9. All combinations of _L_, _Education Acceptance (EA)_, and _CQT_ variables reached the specified level.
10. Of the combinations of _S_, _EA_, and _CQT_ variables, only the combination containing _SS_ failed to reach the specified level.
11. All the combinations of _L_, _Study Attitudes (SA)_, and _CQT_ variables reached the specified level.
12. Of the combinations of _S_, _SA_, and _CQT_ variables, those combinations containing _SC_, _SS_, _I_, and _Verbal (V)_ failed to reach the specified level.
13. All combinations of _L_, _Study Orientation (SO)_, and _CQT_ variables reached the specified level.
14. Of the combinations of _S_, _SO_, and _CQT_ variables, those combinations containing _SC_, _SS_, and _I_ failed to reach the specified level.

In summary, those combinations of variables including both Speed and Information variables generally failed to produce coefficients which reached the specified .05 level of significance for the Female Sample.

A review of the multiple correlations presented in Appendix F for the Total Sample indicates that all coefficients reached the .001 level of significance.

A summary review of the results of the multiple correlations presented in Appendices B, D, and F indicates that 20 of the 84 multiple correlation coefficients for the Female Sample failed to reach the specified .05 level of significance, while all of the coefficients for the Male Sample and for the Total Sample reached the .001 level of significance. With one exception, failure of the coefficient in the Female Sample to reach the specified level of significance was associated with a combination of predictor variables involving both Speed and Information.

Verification of hypotheses. Hypothesis 1 posited that the multiple correlation of GPA with N, S, and either SH or SA would produce a coefficient which would be higher (at the .05 level of significance) than would the coefficient generated by a correlation of GPA with any other combination of three scores, one from each battery. This prediction was not confirmed for any of the three sample groups, nor did any of these combinations produce the highest coefficient of correlation with GPA. In fact, in two of the groups--Male and Total Sample--the highest coefficient produced was significantly higher (at the .05 level) than either of these two combinations.

For the Male Sample the highest multiple correlation coefficient was generated by a combination of *L*, *DA*, and *SC* as predictor variables. It was significantly higher (at the .05 level) than all combinations involving either *SS* or *V*, and significantly higher than 9 of the 14 combinations involving *N*. It was thus higher than 37 of the 83 other combinations.

For the Female Sample the highest multiple correlation coefficient was generated by a combination of *S*, *WM*, and *CQT*. It was significantly higher (at the .05 level) than six of the seven combinations involving both *S* and *SC*, significantly higher than all combinations involving both *S* and *SS*, significantly higher than all combinations involving both *S* and *I*, and significantly higher than five of the seven combinations involving both *S* and *V*. It was thus higher than 25 of the 83 other combinations.

For the Total Sample the highest multiple correlation coefficient was generated by a combination of *L*, *TA*, and CQT. It was significantly higher (at the .05 level) than all the combinations involving either SS or V, significantly higher than six of the seven combinations involving S and I, and significantly higher than all combinations involving both S and N. It was thus higher than 41 of the 83 other combinations.

Hypotheses 2, 3, and 4 dealt with the product-moment correlations of the predictor variables with GPA. Hypothesis 2 posited that the product-moment correlation of CQT Total (CQT) with GPA would yield a higher coefficient (significant at .05 level) than the correlation of any other predictor variable with GPA. This correlation produced the highest coefficient for the Female Sample and for the Total Sample. For the Male Sample it produced a coefficient which was exceeded by that for the correlation of Science Information (SC), but the difference was not significant at the .05 level.

However, despite the fact that this correlation produced generally the highest coefficient among the product-moment correlations, it was not significantly higher than all other predictor variables at the .05 level. In the Male Sample, it was exceeded by that for SC. The SC coefficient itself was significantly higher (at .05 level) than that for all the SSHA variables and the V score but not for the coefficients for the remaining variables.

For the Female Sample CQT produced a coefficient of correlation with GPA which was higher (at .05 level) than that for DA, SH, and TA but not for the coefficients for the remaining variables.

For the Total Sample CQT produced a coefficient which was higher (at .05 level) than that for all variables except SC, I, and L.

Therefore, Hypothesis 2 was not confirmed at the level of significance predicted.

Hypothesis 3 posited that the product-moment correlation of S with GPA would produce a coefficient which would be higher (at the .05 level of significance) than that for any predictor variable other than CQT. This prediction was not confirmed for any of the three sample groups. In the Male Sample the coefficient for S was significantly higher than that for each of the SSHA variables. In the Female Sample and in the Total Sample the coefficient for S was not significantly higher than that for any other predictor variable.

Hypothesis 4 posited that the product-moment correlation of SH or SA with GPA would produce a coefficient which would be higher (at the .05 level of significance) than that for any predictor variable other than CQT and S. This prediction was not confirmed for any of the three sample groups. The coefficient for neither of these variables was significantly higher than that for any other predictor variable.

A test of the significance of the difference between the highest product-moment correlation coefficient for the Male Sample with its highest multiple correlation coefficient (Bruning & Kintz, 1968, pp. 199-201) revealed that the multiple correlation coefficient was not higher than the product-moment coefficient at the .05 level of significance. The same tests of significance for the Female Sample and for the Total Sample again revealed no significant difference at the .05 level.

## Conclusions of the Study

A consistent and somewhat unexpected finding of the study is the relatively greater predictability of male students. They scored somewhat lower than female students on all but four of the predictor variables--SC, SS, I, and N from the CQT. Nevertheless, product-moment rs with GPA were higher than those for females for all but four variables--WM, EA, SO, and V--and differences in these instances were minimal.

When one looks at the standard deviations for each predictor measure, he may find at least a partial explanation of such differences in predictability. These figures are presented in Table 4.

Table 4

Standard Deviations of Predictor Variables

| | L | S | DA | WM | SH | TA | EA | SA | SO |
|---|---|---|---|---|---|---|---|---|---|
| M | 9.0 | 15.4 | 9.8 | 8.9 | 17.0 | 16.0 | 7.3 | 14.8 | 29.1 |
| F | 6.2 | 15.2 | 9.7 | 8.8 | 16.4 | 8.2 | 7.7 | 14.3 | 28.5 |

| | SC | SS | I | V | N | CQT |
|---|---|---|---|---|---|---|
| M | 5.0 | 5.8 | 9.5 | 12.4 | 7.1 | 24.2 |
| F | 4.0 | 3.7 | 6.6 | 10.5 | 4.3 | 16.2 |

It would appear from these findings that there was greater homogeneity in the Female Sample. Its standard deviations are almost uniformly lower than those for the Male Sample, and particularly so for the CQT variables, which constitute the bottom half of the table. This greater homogeneity among female students in this study could account statistically for the relatively lower predictability of female students.

Another factor that should be taken into account here is the rather limited range of discrimination available in the criterion variable. As noted above, grade point averages range from 0.00 to 2.00 since there are only two passing grades, High Pass and Pass. This factor may be somewhat involved in the lower predictability of female students in this sample. It could conceivably have been a depressant of predictive validity for male students as well.

A second conclusion of the study is also somewhat unusual. For the students sampled in this study, the SSHA has rather limited validity in the prediction of grade point average. None of these SSHA *r*s reached the .05 level of significance. This finding is especially unusual in the light of previous studies of the instrument at predominantly black colleges. These studies over a number of years showed *r*s ranging from .42 to .46.[1]

It should be noted that such coefficients were obtained with students who knew that their test scores would be used in a program of student-to-student counseling. A previous study by Holtzman, Brown, and Farquhar (1954) has shown significant increments in predictive validity for those students interested enough to obtain their scores and interpretations of them from one of the test authors, over students who did not make such efforts.

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[1] William F. Brown, personal communication, March 19, 1970.

In view of the findings from the Davis Reading Test for this study, it seems possible that using the high school version of the SSHA might have been more appropriate here. The Davis results showed an average reading level of about ninth grade for the sample.

Brown[2] ventured several other possible explanations for the lack of predictive validity found in this study. He noted that the students sampled in previous studies at predominantly black colleges were students who had considered themselves college-bound and had pursued college preparatory programs for a number of years prior to college entrance. He also noted that the open-door character of the school in this study made it likely that there was a considerable number of students who had not considered college during their high school years. He seemed to think that there might be some differences in the values of these two different groups.

Brown made two other observations which seem pertinent here. First, he noted that colleges in their early years of existence are likely to have a wider degree of variability in their grading practices than are established colleges. This uncontrolled source of variation in the criterion variable could have something to do with the low rs for the SSHA. Second, Brown indicated that institutions which make a special effort to retain their students, as does the school in this study, tend to introduce another element of uncontrolled variability into grade point averages.

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[2] William F. Brown, personal communication, March 19, 1970.

The fact that virtually all the CQT and the Davis Reading Test variables were significantly correlated with GPA for the same sample of students makes one inclined to demur from Brown's hypotheses. It seems more reasonable to conclude that this finding raises an issue that will not be resolved satisfactorily within the confines of this study.

A third conclusion is that scholastic aptitude measures such as the CQT and the Davis Reading Test seem to have adequate predictive validity for the academic success of male students at this predominantly black, public, open-door, urban community college. These results for male students compare favorably with results presented in the CQT manual (Bennett, Bennett, Wallace, & Wesman, 1961, p. 47) for a number of different junior colleges; in fact, validities for male students from this study exceed the average validity reported in the manual for all CQT variables except V, where the difference is minimal.

It would be presumptuous to claim that these findings for males at a predominantly black community college can be generalized to the national black college student population. Nevertheless, it does seem that the CQT merits consideration as a selection device for black male students, particularly those in predominantly black colleges.

As a fourth and final conclusion it should be noted that the addition of the Davis and SSHA variables to CQT variables in multiple correlations did not add significantly to the predictive validity obtainable from the CQT variables alone. Here, the reasons seem obvious enough. For the male and female groups, ten of twelve possible Davis-CQT rs were significant at the .001 level. For the same groups, 66 of 112 possible SSHA rs with CQT and Davis variables were significant at the .05 level or beyond. It seems clear that the Davis and SSHA did not measure qualities sufficiently different from CQT variables to make independent contributions to the multiple correlations.

## Discussion

There seem to be several implications for the college in which the study was conducted. The consistent finding of the relatively respectable predictive validity of the COT and the Davis for male students seems to indicate that these instruments should be retained as potential admissions and placement instruments for male students.

The rather atypical finding of consistently lower predictive validity for females, as well as the generally low predictive validity of the measures, should raise some question as to the appropriateness of these measures in the admission and placement of female students. This is not to say that this study alone justifies abandoning of the COT, the Davis, and the SSHA by admissions and placement personnel. But the search for other predictive instruments seems in order while a replication of this study is being made.

The consistently low predictive validity of the SSHA coupled with the Davis Reading Test results suggests the possibility that the SSHA reading level may be inappropriate for the population under study. This possibility should be borne in mind in any further use of the SSHA with this population.

### Recommendations for Further Research

Two rather atypical findings of this study raise perhaps the most interesting possibilities for further research. The first of these is the relatively lower predictability of female students. The relatively greater homogeneity of female students on these predictor measures is perhaps sufficient statistical explanation for the lower predictability. But it is no explanation of the homogeneity itself.

Replication of the CQT and Davis testing with another sample group seems to be in order to determine whether or not this homogeneity is characteristic of female students in the population. The homogeneity may be simply a feature of this particular sample.

Replication might also test further the proposition that male students are more predictable in this population. There is some indication in a recent study by Astin (1969, pp. 83, 92) that among black students females may actually be slightly less predictable than males.

A second atypical result of this study is the finding that the SSHA has little validity in predicting academic success for this sample of students. The earlier findings of considerable predictive validity of this instrument with black students were obtained within student-to-student counseling programs, and motivation to give an accurate picture of oneself was high. Replication of the SSHA testing with another sample group within the context of such a counseling program would seem advisable. The reading test findings in this study seem to indicate that use of the high school version of the SSHA would be advisable. Such a study is currently in the planning stages at the college as a direct outgrowth of the present study.

In order to enhance the placement capabilities of the Davis and the COT, it is recommended that these instruments be given to a sample of students sufficiently large to afford a representative sample from each curriculum. Although one might predict on the basis of this study that male students would be more predictable as a group, such findings may very well not hold up between curricular groups.

Finally, in order to test the possibility that the findings of this study are more generally applicable, it would be well to replicate the study at other colleges. It is to be hoped that groups matched on the predictor variables would be utilized at both predominantly black and predominantly white colleges. In this way, one might test the proposition that the findings of the present study are applicable to both types of schools.

# Appendix A

## Product-moment Correlations for Male Sample

### Product-moment Correlations for Male Sample

| | L | S | DA | WM | SH | TA | EA | SA | SO | SC | SS | I | V | N | CQT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GPA | 442$^c$ | 400$^c$ | 183 | 047 | 130 | 128 | 173 | 161 | 158 | 518$^c$ | 348$^c$ | 485$^c$ | 290$^b$ | 334$^c$ | 499$^c$ | GPA |
| L | | | 110 | 188 | 035 | 257$^b$ | 208$^a$ | 255$^b$ | 150 | 486$^c$ | 555$^c$ | 594$^c$ | 592$^c$ | 351$^c$ | 630$^c$ | L |
| S | | | 160 | 195$^a$ | 005 | 214$^a$ | 192 | 222$^a$ | 115 | 497$^c$ | 635$^c$ | 649$^c$ | 721$^c$ | 398$^c$ | 860$^c$ | S |
| DA | | | | | | | | | | 067 | 036 | 013 | 057 | 097 | 005 | DA |
| WM | | | | | | | | | | 171 | 227$^a$ | 229$^a$ | 211$^a$ | 198$^a$ | 254$^b$ | WM |
| SH | | | | | | | | | | 128 | 077 | 127 | 077 | 159 | 135 | SH |
| TA | | | | | | | | | | 125 | 195$^a$ | 185 | 281$^b$ | 053 | 262$^b$ | TA |
| EA | | | | | | | | | | 163 | 192 | 203$^a$ | 233$^a$ | 194 | 251$^a$ | EA |
| SA | | | | | | | | | | 155 | 211$^a$ | 211$^a$ | 282$^b$ | 186 | 280$^b$ | SA |
| SO | | | | | | | | | | 153 | 164 | 181 | 188 | 187 | 221$^a$ | SO |

[a] .05 level of significance

[b] .01 level of significance

[c] .001 level of significance

# Appendix B

# Multiple Correlations with Grade Point Average for Male Sample

Multiple Correlations with Grade Point Average

for Male Sample

| Variables 2 & 3 | Variable 4 | | | | | |
|---|---|---|---|---|---|---|
| | SC | SS | I | V | N | CQT |
| L and DA | 577 | 480 | 544 | 464 | 497 | 549 |
| S and DA | 558 | 438 | 522 | 418 | 457 | 544 |
| L and WM | 566 | 462 | 527 | 445 | 486 | 533 |
| S and WM | 547 | 421 | 503 | 401 | 447 | 509 |
| L and SH | 566 | 471 | 527 | 457 | 489 | 531 |
| S and SH | 549 | 434 | 504 | 420 | 454 | 505 |
| L and TA | 562 | 459 | 521 | 443 | 482 | 526 |
| S and TA | 545 | 419 | 498 | 402 | 446 | 502 |
| L and EA | 565 | 464 | 524 | 450 | 485 | 527 |
| S and EA | 548 | 427 | 502 | 412 | 449 | 504 |
| L and SA | 563 | 461 | 522 | 446 | 482 | 525 |
| S and SA | 546 | 423 | 500 | 407 | 446 | 503 |
| L and SO | 565 | 466 | 525 | 452 | 486 | 527 |
| S and SO | 548 | 430 | 503 | 416 | 451 | 504 |

These are all significant at .001 level.

# Appendix C

# Product-moment Correlations for Female Sample

## Product-moment Correlations for Female Sample

| | L | S | DA | WM | SH | TA | EA | SA | SO | SC | SS | I | V | N | CQT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GPA | $309^b$ | $265^b$ | 027 | 128 | 065 | 056 | 179 | 128 | 179 | $242^a$ | $239^a$ | $281^b$ | $302^b$ | 189 | $360^c$ | GPA |
| L | | | 021 | $427^c$ | $218^a$ | $309^b$ | $226^a$ | $299^b$ | $276^b$ | $505^c$ | $537^c$ | $608^c$ | $651^c$ | 033 | $661^c$ | L |
| S | | | 019 | $503^c$ | $264^b$ | $273^b$ | 185 | $255^b$ | $281^b$ | $477^c$ | $668^c$ | $664^c$ | $726^c$ | 029 | $455^c$ | S |
| DA | | | | | | | | | | $222^a$ | 169 | $229^a$ | $242^a$ | 017 | $246^a$ | DA |
| WM | | | | | | | | | | $331^c$ | $564^c$ | $518^c$ | $574^c$ | 073 | $563^c$ | WM |
| SH | | | | | | | | | | $309^b$ | $403^c$ | $414^c$ | $532^c$ | 049 | $448^c$ | SH |
| TA | | | | | | | | | | 180 | $265^b$ | $282^b$ | $254^b$ | 087 | $256^b$ | TA |
| EA | | | | | | | | | | $333^c$ | $271^b$ | $354^c$ | $370^c$ | 136 | $353^c$ | EA |
| SA | | | | | | | | | | $318^b$ | $283^b$ | $351^c$ | $348^c$ | 123 | $335^c$ | SA |
| SO | | | | | | | | | | $338^c$ | $375^c$ | $416^c$ | $438^c$ | 090 | $427^c$ | SO |

[a] .05 level of significance

[b] .01 level of significance

[c] .001 level of significance

# Appendix D

## Multiple Correlations with Grade Point Average for Female Sample

Multiple Correlations with Grade Point Average
for Female Sample

| Variables 2 & 3 | Variable 4 | | | | | |
|---|---|---|---|---|---|---|
| | SC | SS | I | V | N | CQT |
| L and DA | 325[a] | 321[a] | 331[a] | 337[a] | 357[a] | 375[a] |
| S and DA | 296 | 278 | 301 | 311[a] | 322[a] | 381[b] |
| L and WM | 325[a] | 324[a] | 334[a] | 343[a] | 357[a] | 385[b] |
| S and WM | 297 | 280 | 304 | 316[a] | 322[a] | 401[b] |
| L and SH | 326[a] | 323[a] | 334[a] | 347[a] | 357[a] | 385[b] |
| S and SH | 298 | 280 | 305 | 325[a] | 321[a] | 395[b] |
| L and TA | 328[a] | 325[a] | 335[a] | 340[a] | 361[a] | 377[a] |
| S and TA | 297 | 279 | 302 | 311[a] | 323[a] | 382[b] |
| L and EA | 337[a] | 336[a] | 341[a] | 345[a] | 368[a] | 377[a] |
| S and EA | 312[a] | 302 | 314[a] | 320 | 339[a] | 381[b] |
| L and SA | 325[a] | 322[a] | 331[a] | 336[a] | 357[a] | 372[a] |
| S and SA | 298 | 282 | 301 | 310 | 324[a] | 378[a] |
| L and SO | 333[a] | 323[a] | 336[a] | 341[a] | 367[a] | 373[a] |
| S and SO | 306 | 292 | 307 | 314[a] | 335[a] | 378[a] |

[a] .05 level of significance

[b] .01 level of significance

# Appendix E

## Product-moment Correlations for Total Sample

Product-moment Correlations for Total Sample

| | L | S | DA | WM | SH | TA | EA | SA | SO | SC | SS | I | V | N | CQT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GPA | 384$^{c}$ | 327$^{c}$ | 084 | 069 | 090 | 092 | 160 | 136 | 154 | 422$^{c}$ | 313$^{b}$ | 418$^{c}$ | 361$^{c}$ | 291$^{b}$ | 448$^{c}$ | GPA |
| L | | | -056 | 286$^{b}$ | 118 | 283$^{b}$ | 228$^{a}$ | 282$^{b}$ | 210$^{a}$ | 479$^{c}$ | 535$^{c}$ | 582$^{c}$ | 617$^{c}$ | 223$^{a}$ | 633$^{c}$ | L |
| S | | | 000 | 342$^{c}$ | 141 | 252$^{a}$ | 183 | 258$^{b}$ | 212$^{a}$ | 460$^{c}$ | 606$^{c}$ | 614$^{c}$ | 730$^{c}$ | 220$^{a}$ | 693$^{c}$ | S |
| DA | | | | | | | | | | 104 | 013 | 064 | 083 | 026 | 081 | DA |
| WM | | | | | | | | | | 211$^{a}$ | 309$^{b}$ | 300$^{b}$ | 362$^{c}$ | 083 | 345$^{c}$ | WM |
| SH | | | | | | | | | | 171 | 155 | 195$^{a}$ | 251$^{a}$ | 058 | 228$^{a}$ | SH |
| TA | | | | | | | | | | 131 | 204$^{a}$ | 202$^{a}$ | 283$^{b}$ | 059 | 257$^{b}$ | TA |
| EA | | | | | | | | | | 204$^{a}$ | 194 | 228$^{a}$ | 305$^{b}$ | 052 | 275$^{b}$ | EA |
| SA | | | | | | | | | | 195$^{a}$ | 214$^{a}$ | 235$^{a}$ | 324$^{c}$ | 061 | 291$^{b}$ | SA |
| SO | | | | | | | | | | 197$^{a}$ | 206$^{a}$ | 231$^{a}$ | 303$^{b}$ | 065 | 279$^{b}$ | SO |

[a] .05 level of significance

[b] .01 level of significance

[c] .001 level of significance

# Appendix F

## Multiple Correlations with Grade Point Average for Total Sample

Multiple Correlations with Grade Point Average
for Total Sample

| Variables 2 & 3 | Variable 4 | | | | | |
|---|---|---|---|---|---|---|
| | SC | SS | I | V | N | CQT |
| L and DA | 475 | 417 | 459 | 423 | 449 | 471 |
| S and DA | 450 | 367 | 432 | 378 | 404 | 451 |
| L and WM | 475 | 410 | 460 | 424 | 441 | 478 |
| S and WM | 453 | 363 | 435 | 381 | 400 | 459 |
| L and SH | 470 | 406 | 452 | 415 | 440 | 466 |
| S and SH | 448 | 359 | 427 | 373 | 399 | 449 |
| L and TA | 470 | 405 | 453 | 417 | 438 | 500 |
| S and TA | 448 | 357 | 427 | 373 | 397 | 449 |
| L and EA | 472 | 410 | 455 | 417 | 444 | 467 |
| S and EA | 452 | 368 | 432 | 377 | 409 | 450 |
| L and SA | 470 | 405 | 452 | 415 | 439 | 467 |
| S and SA | 449 | 360 | 428 | 373 | 400 | 449 |
| L and SO | 472 | 409 | 454 | 417 | 443 | 467 |
| S and SO | 451 | 365 | 430 | 376 | 405 | 450 |

These are all significant at .001 level.

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